Bioremediation, Inc.

Bioremediation, Inc. Water Treatment family of products has been developed to improve biological and physical processes in wastewater systems. They were formulated as all-natural organic, botanical synergistic effects stimulate bacteria, and they consequently become very effective in decomposing and converting organic matter. Additionally, these wastewater micro-organisms will produce highly-concentrated hydrolytic enzymes. The microbial action developed within these products accelerates this enzyme activity.

Bioremediation, Inc. Products have a broad application potential to improve various processes and operations in wastewater systems. Some of the more obvious areas, achieving strong results and improvement, are as follows:

- Oil/Grease removal;
- Sludge reduction;
- Odor control;
- Ammonia reduction; and
- Heavy metal removal.

The above improvements typically are justified based upon cost versus the benefits for a given level of performance. Other process improvements with our products can be energy reduction and primary chemical elimination, especially aluminum sulfate and ferric chloride.

Bioremediation, Inc. offers a full range of testing for feasibility in wastewater treatment plant operations and infrastructure mechanical systems.

Biological treatment of waster water is used primarily to remove the biodegradable, organic substances (colloidal or dissolved). Nitrogen and phosphorous can also be reduced and eliminated by biological treatment.

Bacteria are the primary micro-organism used in the removal of carbonaceous BOD and the stabilization of organic matter when biological treatment is employed. Over the past 15 years, a significant number of bacteria strains and botanical compounds have been evaluated and tested to improve wastewater treatment.

Recently, it was determined that the latest botanical compounds developed have strong synergistic results in wastewater. This stimulation of existing bacteria with nutrients in products became very effective in converting and decomposing organic matter at a high rate. The stronger micro-organisms developed will produce highly-concentrated hydrolytic enzymes which become very effective in converting substrate/food to end products. The microbial action

Developed in Bioremediation, Inc. products dramatically accelerate this enzyme activity. Additionally, changes in ratio of food to micro-organisms (F/M) takes place as well.

Biological waste treatment is based on the principles governing the growth of micro-organisms. The micro-organisms of primary importance in biological treatment are bacteria. Bacteria can reproduce by binary fission, dividing sexually or by budding. Generation time varies from 20 minutes to several hours depending on a host of various environmental limitations in the wastewater system. These limitations can be system size, nutrient concentration and substance concentration.

Growth patterns based on the number of cells have essentially four distinct phases. They are described as:

1. Lag Phase – the time required for organisms to acclimate to their new environment;
2. Lag-Growth Phase – the period when cells divide at a rate determined by their generation time and ability to process food;
3. Stationary Phase – a time where the cell population remains stationary (cells have exhausted food and new cell growth by death of old cells);
4. Lag Death Phase – the bacteria death rate exceeds the production of new cells.

In many instances, biological treatment units are composed of complex, interrelated, mixed biological populations, with each particular micro-organism in the system having its own growth curve. While the bacteria are of primary importance, many other micro-organisms take part in the stabilization of the organic waste.

Almost all wastewaters can be treated biologically. Bioremediation, Inc. Products were developed to optimize wastewater treatment process and operations, including but not limited to:

- Aerobic Suspended-Growth Treatment Processes;
- Aerobic Sludge Digestion;
- Anaerobic Sludge Digestion;
- Aerobic Attached-Growth Treatment Processes; and
- Aerobic Stabilization Ponds.

Most engineering considerations are economically-driven, and Bioremediation, Inc. Products have proven to be economically feasible. Additionally, special formulations for high-strength and complex wastewater are also financially feasible.